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(54) Mixing and discharge capsule.

(57) A combination mixing and discharge capsule for storing separate ingredients which are to be mixed together prior to use and including a container body (10) for one ingredient (16) closed at one end by a slidable piston (12) and the opposite end being displaceably received in a cup-shaped cap (18) which forms a second compartment (26) with a perforated wall (14) of the container body opposite the end containing the piston for receiving a frangible pillow (28) containing a liquid second ingredient (29) to be mixed with the ingredient in the body. The cap has a discharge nozzle (20) extending axially therefrom and when the cap is displaced farther onto the body the innermost wall (30) of the pillow is burst to cause the discharge of the liquid ingredient through the perforated wall end into the container body for mixing with the ingredient therein. After mixing is completed, a puncturing rod (48) is inserted into the nozzle to puncture the opposite wall (32) of the pillow and, when the rod is withdrawn the piston is moved toward the perforated wall to effect discharge of the mixed ingredients through the nozzle.

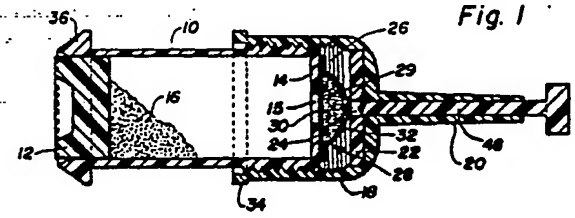

Fig. 1

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BACKGROUND OF THE INVENTION

This invention pertains to a combination mixing and discharge capsule which contains different ingredients in the field of Dentistry but, nevertheless, is also applicable to other fields of use, especially where small quantities of different materials are to be mixed and particularly where a pulverant or granular material is to be mixed with a certain type of liquid material. By way of example, capsules of this type frequently are used in Dentistry to mix certain ingredients to form cements and the like, as well as amalgams and other dental filling mixtures and materials.

It has been relatively common heretofore to provide capsules in which only mixing of different ingredients occurs, without said capsules being provided with any particular means for discharge other than removing a cap from one end of the capsule and removing the enclosed mixture in any convenient manner. One example of such device comprises the subject matter of prior U.S. Patent Number 3,655,035 dated April 11, 1972 in the name of Muhlbauer. In this patent, pulverant material is contained in a body which is closed at one end by a telescoping cap, and the other end has means to engage a rupturable pillow in which a second ingredient is contained and adapted to be discharged into the hollow body with the first material and vibrated in a suitable mechanism to effect the mixture, after which the cap is removed to permit the mixture to be removed therefrom but no means to effect discharge by pressure are included in the structure.

A number of other capsules also have been developed which include means for intially containing different ingredients and then mixing the same, followed by discharging the mixture from the body of the capsule through a nozzle or the like. The following prior U.S. Patents represent examples of this type of device:

3,537,605 - Solowey November 3, 1970
3,595,439 - Newby etal July 27, 1971
3,684,136 - Baumann (1) August 15, 1972
3,739,947 - Baumann (2) June 19, 1973
3,907,106 - Purrmann September 23, 1975

In the foregoing patents, although they are provided with discharge means as well as the mixing of initially separated materials in a common mixing chamber, certain improvements have been developed in the instant invention which are believed to offer advantages over the aforesaid prior art both from the stand point of manufacture and ease of assembly and operation, details of which are set forth below.

SUMMARY OF THE INVENTION

It is among the objects of the present invention to provide a container body which preferably is molded from plastic material, for example, but without restriction thereto, said body being hollow and adapted to contain a first ingredient, such as powdered material and the same is initially contained in the compartment by a plunger telescopically mounted in one initially open end of the container body and the opposite end of the body has a perforated transverse wall integral therewith to form one end of a second compartment in which a rupturable pillow containing a second, usually liquid ingredient, the second compartment being completed by the use of a cup-like cap which is displaceable on said body and is also provided with an elongated nozzle co-axial with the cap and container body and the arrangement being such that when the cap is displaced farther onto the body, preferably the wall of the pillow which is closest to the perforation is ruptured and continued pressuring from the cap forces the liquid material into the mixing compartment where it engages the pulverant material therein and, by vibration, mixing occurs and is followed by suitably rupturing the opposite wall of the pillow by inserting a piercing member into the nozzle, after which the plunger is moved towards the nozzle to forcibly eject the mixed material therethrough. If desired, the discharge may be effected directly into a prepared cavity in a tooth, for example, especially if the mixture is a filling material or, if it is a cement, discharge may be effected directly onto the desired area.

Another object of the invention is preferably to provide the container in form of a pillow having opposed walls, jointly sealed at the peripheries thereof, said walls being formed from suitable metal foil sheet material, for example, or plastic material, or a laminate thereof, and the wall which is placed closest to the perforated end of the container body is rendered more readily rupturable than the opposite wall preferably by being thinner than said opposite wall but said opposite wall also being capabe of being perforated by a piercing rod or otherwise when discharge of the material is to be effected.

A further object of the invention is to provide a piston of simple design and jointly serving as a closure for the initially open end of the container body but being provided with no required means to effect removal of the piston from the body inasmuch as the same is only intended and designed

for operating as a piston to effect discharge of mixed material from the nozzle which extends from the cap which is threaded onto the opposite end of the container body.

Still another object of the invention is to provide on the container body means by which the body may engage a seat in an appropriate pressure apparatus, either manually or power-operated, and thus suitably position the capsule for operation of the discharge piston for movement within the container body in the direction of the nozzle of the cap thereon.

Details of the foregoing objects and of the invention are set forth in the following specification and illustrated in the accompanying drawings comprising a part thereof.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 is a longitudinal sectional view of a capsule embodying principals of the present invention and is illustrated with the parts in the desired initial positions thereof in the capsule.

Fig. 2 is another longitudinal sectional view illustrating the rupturing of a pillow which contains a second ingredient to be mixed with the first ingredient in the capsule.

Fig. 3 is another longitudinal sectional view similar to the preceeding figures and especially Fig. 2 but in which the second wall of the pillow has been penetrated by a piercing tool and the figure otherwise showing a mixture of the two materials within the capsule body.

Fig. 4 is an exemplary illustration of the capsule shown in the preceeding figures and especially in Fig. 3 as being mounted within one example of a pressure apparatus, specifically of a manual type, by which the piston is in process of forcibly discharging mixed material from the nozzle into an exemplary prepared cavity in a tooth.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Referring to Fig. 1, there is illustrated therein a container body 10 which preferably is molded from suitable plastic material but may also be made from other appropriate material such as, for example, metal. One end of the body is open initially and is closed by a combination closure and piston 12 which may be made from any suitable material such as plastic or rubber-like materials suitable to render the same operable effectively as a piston which is telescopically inserted into said initially open end of the body 10.

The opposite end of the body has an integral transverse wall 14 that is provided with a preferably central perforation 15. One exemplary ingredient 16, of measured quantity for example, is filled into the interior of the container body 10 before the piston 12 inserted therein.

Threadably fitted onto the opposite end of the body 10 which has the wall 14 thereon is a cup-like cap 18 and the other end of the cap has an orifice that is an integral discharge nozzle 20 formed therewith. On the interior of the end of the cap from which the nozzle 20 extends, a gasket disc 22 is mounted and is provided with a central hole or perforation 24 which is aligned with the inlet end of the nozzle 20. Within the cap 18 between the wall 14 and disc 22 is a second compartment 26 within which a container, preferably a so-called pillow 28, is positioned. Said pillow is formed preferably from suitable metal foil material which is impervious to a selected liquid material, such as mercury, or otherwise. Another appropriate material would be a suitable plastic sheet material or a laminate of plastic and metal foil. For convenience, suitable discs of the material are formed, and one or both of them are bulged in order to provide a cavity in which a second ingredient 29 is contained and the discs are sealed at the edges or peripheries. In the preferred construction, the opposite discs actually comprise walls and the wall 30 is oriented toward, abuts and is disposed against the wall 14. The wall 30 of the frangible container or pillow 14 is preferably thinner than the opposite wall 32, for purposes to be described below.

When mixing of the materials 16 and 28 is to be effected, the cap 18 is displaced farther onto the container body 10 for purposes of decreasing the space or compartment 26 and thereby cause the gasket 22 to co-act with wall 14 to compress pillow 28 by moving the wall 32 toward wall 30. When pressure is sufficient, wall 30 will rupture adjacent perforation 15 and thereby cause discharge of the material 28 into the compartment which already contains materials 16, somewhat as in the manner illustrated in Fig. 2 and in which the pillow 28 has been substantially completely compressed, but the wall 32 usually has not been penetrated at this time in the operation.

The preferred means to effect displacment of the cap 18 on body 10 are complementary threads respectively thereon but it is to be understood that other displacement means may be used in lieu of threads. To facilitate the rotation and threading of the cap 18 onto the container body 10, the initially open end of the cap 18 may be provided with an annular rim 34 which, if desired, may be serrated to effect desired gripping ther of. Also, the end of the container body 10 in which the piston 12 is mounted also preferably has another annualar rim

or flang 36 formed thereon and, if desired, the periphery thereof may also be serrated to facilitate gripping the same for effecting relative rotation between the body 10 and cap 18. The flange 36 also suitably is used to abut a shoulder, for example in a discharging apparatus or tool 38 which, as specifically illustrated in Fig. 4, is of a manual type having ears 40 to receive for example two fingers of a human hand, while a thumb may be applied against the button 42 in order to force the plunger 44 against piston 12, as shown in Fig. 4.

In order to effect discharge of the mixed material 46 from the container body 10, attention is directed to Fig. 3 in which it will be seen that the nozzle 20 has had a piercing rod 48 projected therein, preferably for the full length, for example, in order to extend through the perforation 24 in gasket 22 and thereby pierce the disc or wall 32 of pillow 28, following which piercing rod 48 is removed and thereby clears the interior of nozzle 20 to receive the material 46 as it is forcibly ejected from nozzle 20 by inward movement of the piston 12, either by the exemplary type of apparatus 38 shown in Fig. 4 or some other manual or power-operated device, as desired.

Initially, as shown in Figs. 1 and 2, and particularly for purposes of convenience, the exemplary piercing rod 48 may be mounted within the nozzle 20 in partially extended position, as shown in said figure and in which the inner end of the piercing rod is only aligned with the central perforation 24 of gasket 22. By so providing the piercing rod in this manner, there is no need for a dentist or other operator to hunt for a piercing tool and all necessary parts of the capsule are assembled in operative position and ready for use such as in the initial positions thereof illustrated in Fig. 1.

When the capsule has been mounted in discharging position, as shown in Fig. 4 in exemplary manner, it will be seen that in the event that material 46 is of a filling type to be applied to a cavity 50 in tooth 52, the discharging material conveniently may be directly applied to the cavity. However, in the event the material is of a cement nature, with equal facility, it may be applied to a suitable area or surface where usage is needed. Other materials also are readily capable of being mixed within the capsule of the invention and discharged therefrom in a manner as described herein above.

The foregoing description illustrates preferred embodiments of the invention. However, concepts employed may, based upon such description, employed in other embodiments without departing from the scope of invention. Accordingly, the following claims are intended to protect the invention broadly, as well as in the specific forms shown herein.

Claims

1. A combination mixing and discharge capsule comprising in combination, a body adapted to contain a first ingredient and having a piston in one end and the opposite end having a perforated wall on the body, a cap displaceably connected over the end of the body having the perforated wall and forming therewith a separate compartment, said cap having a discharge orifice opening outwardly away from the end of said body, a frangible container enclosing a second ingredient and disposed in said separate compartment with a wall oriented toward said perforated wall, whereby when said cap is displaced farther onto said body at least the wall of the container oriented toward said perforated wall is ruptured to permit discharge of the container contents through said perforation into said container body for mixing with the ingredient therein, and means operable to puncture the opposite wall of said container, whereby said piston may be moved into said body to engage the mixed ingredients and force the same through said discharge orifice.

2. The capsule according to Claim 1 further including means to displace said cap farther onto said body to effect rupturing said container as foresaid.

3. The capsule according to Claim 2 on which said means to displace said cap further onto said body comprises complementary threads on said cap and body.

4. The capsule according to Claim 1 in which said discharge orifice is a nozzle extending substantially axially from said cap, said means to puncture said opposite wall of said container is a piercing rod initially only partially inserted into said nozzle with the inner end out of contact with said container and the inner end of said rod being extendable through said perforation in said opposite wall to effect perforation of said container.

5. The capsule according to Claim 4 further characterized by said container comprising a pillow having a pair of opposite rupturable walls and the edges of said walls being sealed together to enclose said second ingredient therein, said second ingredient being liquid.

6. The capsule according to Claim 5 in which said pillow has the wall which is oriented toward said perforated wall disposed against said perforated wall of the body and more readily subject to rupture than the opposite wall thereof.

7. The capsule according to Claim 5 in which said wall of the pillow which is oriented toward said perforated wall disposed against said perforated wall of the body and being thinner than the opposite wall of said pillow to render it more readily subject to rupture.

8. The capsule according to Claim 1 in which said piston in said one end of said container body also forms a closure therefor to prevent loss of the ingredient in the body of the capsule from said one end and said piston having no means to render it removable from said body.

9. The capsule according to Claim 1 in which said container body also is provided with means to engage a seat in a pressure apparatus to facilitate the discharging operation of said piston.

10. The capsule according to Claim 9 in which said means comprises a laterally extending flange engageable with a seat in a pressure apparatus for extrusion of the mixed contents of said body.

Fig. 1

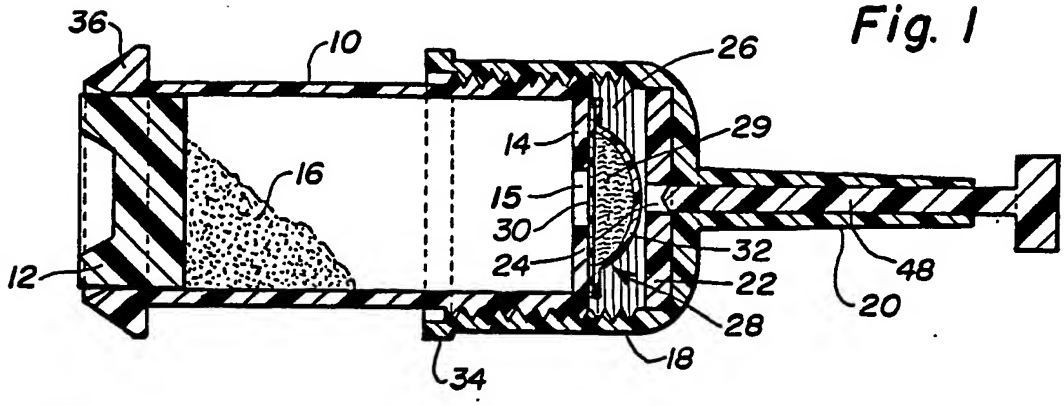


Fig. 2

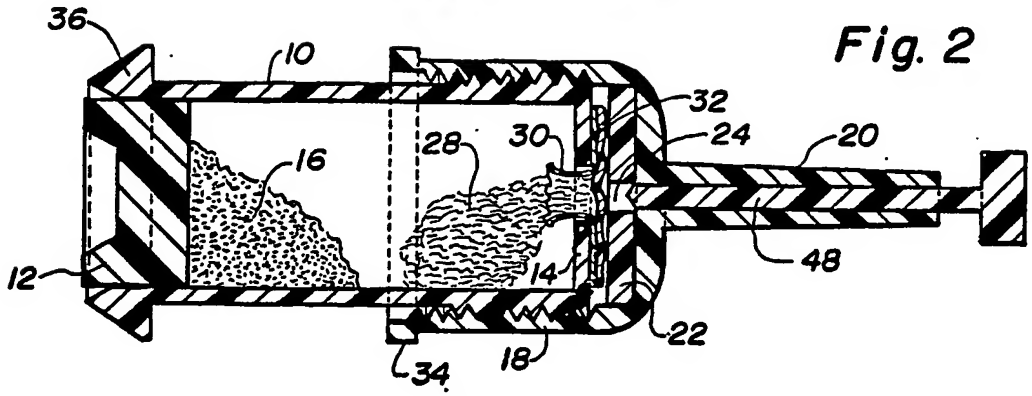


Fig. 3

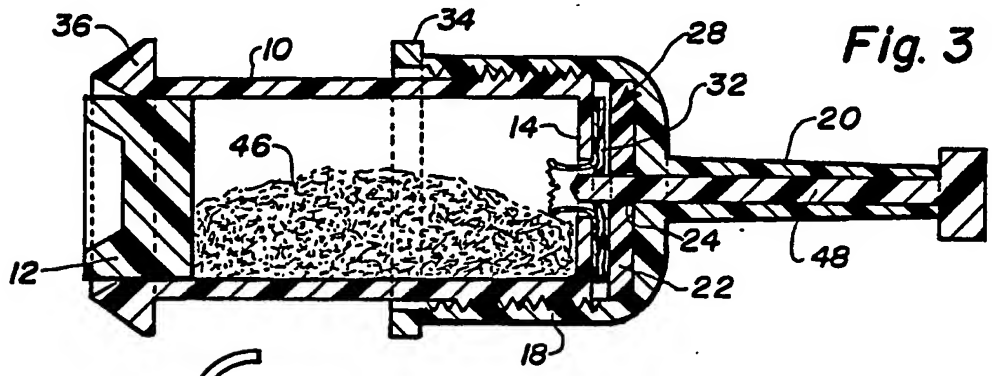
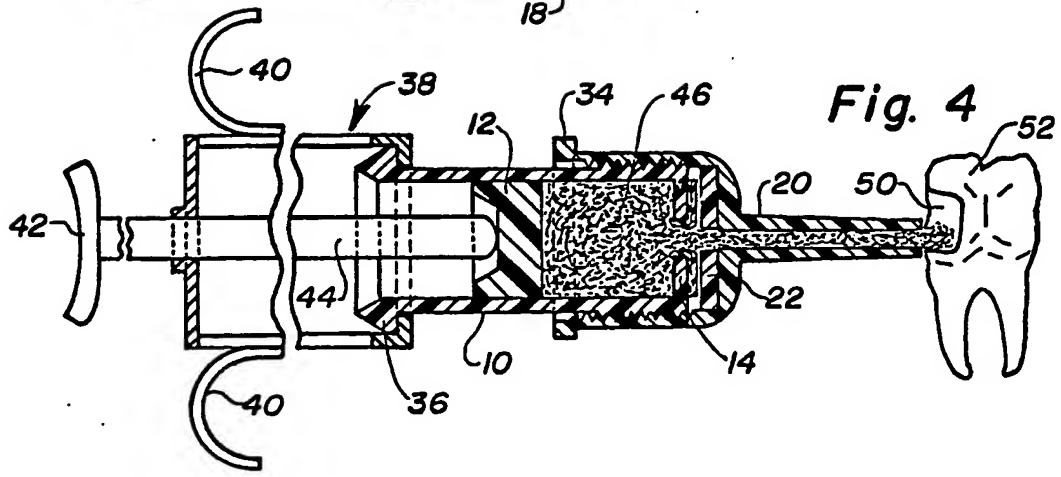


Fig. 4



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EUROPEAN SEARCH REPORT

Application number

EP 87 10 6667

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
D,A	US-A-3 684 136 (BAUMAN) * column 9, line 33 - column 10, line 67; figures 3-6 *	1-3,5, 8	A 61 C 5/06 B 65 D 81/32
D,A	US-A-3 655 035 (MÜHLBAUER) * column 3, line 34 - column 4, line 20; figure 1 *	1-3,5	
A	DE-U-7 234 305 (ETABLISSEMENT DENTAIRE IVOCLAR) * page 3, line 6 - page 6, line 9; figure *	1,2,5	
A	DE-A-1 939 316 (ETABLISSEMENT DENTAIRE IVOCLAR) * page 2, line 25 - page 5, line 9; figures 1-4 *	1	
A	DE-B-2 045 509 (MINNESOTA MINING AND MANUFACTURING CO.) * figures 1-5 *	1	
A	US-A-4 515 267 (WELSH) * abstract; figures 1-7 *	1	
A	FR-A-2 074 748 (SERBAN) * page 2, lines 3-33 *	1,6	

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TECHNICAL FIELDS SEARCHED (Int. Cl.4)

A 61 C 5/00
A 61 J 1/00
A 61 M 3/00
B 65 D 81/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	28-07-1987	SIMON J J P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EUROPEAN SEARCH REPORT

Application number

EP 87 10 6667

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-4 470 505 (KORWIN et al.) * column 5, lines 44-52; figure 4 *	1,9,10	
A	US-A-2 404 316 (SACK) * column 1, line 38 - column 2, line 29 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)

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